

Patent claims

1. A use of a disposable container comprising a cylinder (1) with a plunger (2, 24) that is guided
5 displaceably in said cylinder, and a connection (3) that is provided at a first end (E1) of the cylinder (1) remote from the plunger (2, 24), said container being designed to create a difference in pressure in a microfluidic device (13), to store
10 an agent (F, P) for processing molecules, and/or to act as a reaction vessel.
2. The use as claimed in claim 1, in which the processing agent (F, P) is a liquid, a gel or a
15 solid or a combination of these.
3. The use as claimed in claim 1 or 2, in which the solid comprises at least one of the following constituents: soluble or suspendable particles,
20 lyophilisate, chromatographic material, preferably an ion exchanger or an affinity matrix.
4. The use as claimed in one of the preceding claims, in which the processing agent (F, P) is selected
25 from the following group: lysis liquid, elution liquid, buffer solution, beads, enzymes, primers, reactant, reagents.
5. The use as claimed in one of the preceding claims,
30 in which the processing is an analysis, synthesis, purification, modification and/or increase in concentration of the molecules.
6. The use as claimed in one of the preceding claims,
35 in which the disposable container is filled completely with the processing agent.
7. The use as claimed in one of the preceding claims,

in which the plunger (2, 24) is made from an elastic plastic, preferably from rubber or plastic.

- 5 8. The use as claimed in one of the preceding claims, in which the plunger (2, 24) has at least one circumferential seal which is symmetrical in cross section.
- 10 9. The use as claimed in one of the preceding claims, in which the plunger (2, 24) is designed corresponding to the connector (3) so that, when the plunger (2, 24) bears on the first end (E1), it is possible to completely empty the cylinder
15 (1) and if appropriate the connector (3).
10. The use as claimed in one of the preceding claims, in which the plunger (2, 24) comprises a means (12) for engagement of a pushing and/or pulling
20 means.
11. The use as claimed in one of the preceding claims, in which a pushing and/or pulling means (10) is fitted on the plunger (2, 24).
25
12. The use as claimed in one of the preceding claims, in which the pushing and/or pulling means (10) has, at the free end, a means for engaging in a pushing and/or pulling device.
30
13. The use as claimed in one of the preceding claims, in which the cylinder (1) is made from a transparent material or from a material that does not transmit light.
35
14. The use as claimed in one of the preceding claims, in which the cylinder (1) is made from an elastic plastic, preferably polypropylene.

15. The use as claimed in one of the preceding claims,
in which the connector (3) is closed by a closure
means (4).
- 5 16. The use as claimed in one of the preceding claims,
in which the closure means (4) is a rubber or
plastic membrane, a ball, a cone or a closure
cylinder.
- 10 17. The use as claimed in one of the preceding claims,
in which the ball, the cone and/or the closure
cylinder are made from an inert plastic or from
glass.
- 15 18. The use as claimed in one of the preceding claims,
in which a radially inwardly protruding projection
(11) blocking a displacement of the plunger (2,
24) out of the cylinder (1) is provided at a
second end (E2) of the cylinder (1) remote from
20 the connector (3).
19. The use as claimed in one of the preceding claims,
in which another radially inwardly protruding
projection is provided at the second end (E2) and
25 offers resistance to a displacement of the plunger
(2, 24) in the direction of the connector (3).
20. The use as claimed in one of the preceding claims,
in which a means is provided for automatic reading
30 out of information concerning the processing agent
(F, P) received in the disposable container.
21. The use as claimed in one of the preceding claims,
in which the means is a barcode, a transponder, a
35 chip or a specific shaping.
22. A microfluidic device for processing molecules,
with an apparatus (13) comprising at least one
channel (16, 17) for conveying a specimen (PF),

at least two connector pieces (8, 14) for attachment of two disposable containers being provided on the channel (16, 17),

5

each of the disposable containers having a cylinder (1) with a plunger (2, 24) guided displaceably therein, and a connector (3) provided at a first end (E1) of the cylinder (1) remote from the plunger (2, 24), and

10

the disposable containers being attached, via the connector (3) provided respectively thereon, to one of the connector pieces (8, 14) so that, by displacement of one of the plungers (2, 24), liquid (F) can be conveyed through the channel (16, 17).

15

23. The device as claimed in claim 22, in which the channel (16, 17) is a channel system comprising several interconnected channels.

20

24. The device as claimed in claim 22 or 23, in which the channel (16, 17) or the channel system is designed at least in some sections with a meandering configuration.

25

25. The device as claimed in one of claims 22 through 24, in which the apparatus (13) in conjunction with the channel (16, 17) comprises a microfluidic mixing chamber and/or a microfluidic reaction chamber and/or a microfluidic detection chamber and/or a bubble trap.

30

26. The device as claimed in one of claims 22 through 25, in which the channel (16, 17) has a diameter of at most 2 mm, preferably of less than 1.5 mm.

35

27. The device as claimed in one of claims 22 through

- 26, in which the apparatus (13) comprises at least one means selected from the following group: sensor, electrode, temperature unit, sieve, filter, membrane, affinity matrix, pre-stored substance, magnet.
- 5
28. The device as claimed in one of claims 22 through 27, in which a connection channel (16) is provided connecting the connector piece (8, 14) to the channel (17).
- 10
29. The device as claimed in one of claims 22 through 28, in which an inlet opening (19) is provided which is connected to the channel (17) and can be closed preferably by means of a first valve (18).
- 15
30. The device as claimed in one of claims 22 through 29, in which an outlet opening (21) is provided which is connected to the channel (18) and can be closed preferably by means of a second valve (20).
- 20
31. The device as claimed in one of claims 22 through 30, in which, by displacement of one of the plungers (2, 24), liquid (F) can be conveyed into the other disposable container.
- 25
32. The device as claimed in one of claims 22 through 31, in which each connector piece (8, 14) comprises a tube piece, preferably a hollow needle (9), for opening a closure means (4) which closes the connector (3).
- 30
33. The device as claimed in one of claims 22 through 32, in which the connector piece (8) and/or the tube piece is closed by a further closure means (15).
- 35
34. The device as claimed in one of claims 22 through 33, in which the disposable container is a

disposable container as claimed in one of claims 1 through 20.

- 5 35. The device as claimed in one of claims 22 through 34, in which each of the disposable containers has a connector (3) corresponding to the connector pieces (8, 14).
- 10 36. The device as claimed in one of claims 22 through 35, in which the apparatus (17) comprises at least one preferably cylindrical recess (7) which corresponds to the external diameter of the disposable container and which is used for guiding the connector (3) of the disposable container into
15 a position of engagement with the connector piece (8, 14).
- 20 37. The device as claimed in one of claims 22 through 36, in which the apparatus furthermore comprises a means for fixing the disposable container in a fixed position relative to the connector piece.
- 25 38. The device as claimed in one of claims 22 through 37, in which the fixing means comprises a means which ensures that the disposable container pushed completely into the recess (7) and engaging in the connector piece (8, 14) is held in a fixed position.
- 30 39. The device as claimed in one of claims 22 through 38, in which the holding means is at least one first locking means (26) engaging round the edge of the second end (E2) of the disposable container.
- 35 40. The device as claimed in one of claims 22 through 39, in which a distance (A) between the first locking means (26) and the connector piece (8) is chosen such that the disposable container can be

inserted into the recess (7) without a closure means (4) provided thereon being opened.

- 5 41. The device as claimed in one of claims 22 through 40, in which the disposable container(s) is (are) received in the recess (7) with the closure means (4) unopened.
- 10 42. The device as claimed in one of claims 22 through 41, in which second locking means (27) are provided on the cylinder (1) of the disposable container and/or on the inner wall of the recess (7).
- 15 43. The device as claimed in one of claims 22 through 42, in which the second locking means (27) are designed such that the disposable container can be displaced into a first locking position in which the connector (3) closes the connector piece (8) in a liquid-tight manner.
- 20 44. The device as claimed in one of claims 22 through 43, in which the second locking means (27) are designed such that the disposable container can be displaced from the first locking position to a second locking position in which the connector (3) closes the connector piece (8) in a liquid-tight manner and the tube piece (9) pierces the closure means (4).
- 30 45. The device as claimed in one of claims 22 through 44, in which liquid is pre-stored in the channel.
- 35 46. The device as claimed in one of claims 22 through 45, in which several recesses (7) are provided on one side of the apparatus (13).
47. The device as claimed in one of claims 22 through 46, in which the apparatus is made in one piece

from plastic.

48. The device as claimed in one of claims 22 through 47, in which the apparatus (13) comprises a means
5 for automatic reading out of information concerning the agent (F, P) received in the apparatus (13).
49. The device as claimed in claim 48, in which the
10 means is a barcode, a transponder, a chip or a specific shaping.
50. A method for processing molecules, with the following steps:
15
provision of at least two disposable containers, each of which comprises a cylinder (1) with a plunger (2, 24) guided displaceably therein, and a connector (3) provided at a first end (E1) of the
20 cylinder (1) remote from the plunger (2, 24),

provision of a microfluidic apparatus (13) having at least one channel (16, 17), at least two connector pieces (8, 14) for attachment of the
25 disposable containers being provided on the channel (16, 17),

attachment of the disposable containers, via the connectors (3) provided on them, to the connector
30 pieces (8, 14),

displacement of one of the plungers (2, 24) so that a liquid (F) is conveyed in the channel (16, 17).
35
51. The method as claimed in claim 50, in which the liquid (F) is contained in one of the disposable containers.

52. The method as claimed in claim 50 or 51, in which the liquid (F) is conveyed from the one disposable container into the other.
- 5 53. The method as claimed in one of claims 50 through 52, in which, when one of the disposable containers is being filled, the plunger (2, 24) received therein is displaced by the pressure of the liquid.
- 10 54. The method as claimed in one of claims 50 through 53, in which, by displacement of one of the plungers (2, 24), a liquid located in the channel (16, 17) is displaced into a predetermined, preferably meandering section of the channel (16, 17) and/or into a microfluidic mixing chamber and/or into a microfluidic reaction chamber and/or into a microfluidic detection chamber and/or into a bubble trap.
- 15 55. The method as claimed in one of claims 50 through 54, in which, in order to control the movement of the liquid in the channel (16, 17), at least one valve (18, 20) provided therein is opened and/or closed in accordance with a predetermined program.
- 20 56. The method as claimed in one of claims 50 through 55, in which the disposable container is pushed into a recess (7) provided on the microfluidic apparatus.
- 30 57. The method as claimed in one of claims 50 through 56, in which the disposable container in the recess (7) is displaced into a first locking position such that the connector (3) closes the connector piece (8) in a liquid-tight manner.
- 35 58. The method as claimed in one of claims 50 through 57, in which the disposable container is displaced

from the first locking position into a second locking position such that the connector (3) closes the connector piece (8) in a liquid-tight manner and the tube piece (9) pierces the closure means (4).

59. The method as claimed in one of claims 50 through 58, in which, by means of the displacement of the plungers (2, 24), the liquid (F) is conveyed in the apparatus (13) in such a way that the steps required for carrying out at least one of the following processes are executed: washing, purification, PCR, detection.